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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/090,371	03/04/2002	Dawei Huang	HUANG 2-1 (58655)	5175
46290	7590	09/16/2005	EXAMINER	
WILLIAMS, MORGAN & AMERSON/LUCENT 10333 RICHMOND, SUITE 1100 HOUSTON, TX 77042			TORRES, JOSEPH D	
			ART UNIT	PAPER NUMBER
			2133	

DATE MAILED: 09/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/090,371	Applicant(s) HUANG ET AL.	
	Examiner Joseph D. Torres	Art Unit 2133	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 August 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 November 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

ET

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 08/19/2005 have been fully considered but they are not persuasive.

The Applicant contends, "In the Office Action, claims 1-22 were rejected under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter that Applicants regard as the invention. Claim 1-22 were also rejected under 35 USC 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements. The Examiner's rejections are respectfully traversed. First, the Examiner alleges that 'forming an expanded digital input data sequence based on a constraint length' is indefinite since it is not clear how the constraint length is used to form the expanded digital input data sequence. Applicants respectfully disagree and note that inserting zeros expands the digital input data sequence. Furthermore, one embodiment of the present invention inserts one zero after each $(K-1)$ information bits, where K is the constraint length. See Patent Application, page 12, 11. 11-12. Accordingly, Applicants respectfully submit that the specification does describe forming an expanded digital input data sequence based on a constraint length".

The Examiner disagrees and asserts that claim 1 only recites, "forming an expanded digital input data sequence based on a constraint length" and the constraint length is an

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indefinite parameter that can be any constraint length. For Example, a constraint length N could be the maximal allowed block size, the maximum number of information bits or almost any communication parameter that serves to constrain the communication system to a particular mode of operation. Second of all "based on", by itself, is generally indefinite. For example, if the constraint length is related to the number of memory elements in a convolutional encoder, then since convolutional encoded data is encoded by the convolutional encoder the convolutional encoded data is based on the constraint length and any element that operates on or uses the convolutional encoded data, operates on or uses, based on the constraint length, the convolutional encoded data since the convolutional encoded data itself is based on the constraint length; hence it is even hard to see how the phrase "based on a constraint length" even adds any meaningful limitation to any claim.

The Applicant contends, "Second, the Examiner alleges that the specification does not state that the inserted zeroes comprise an equivalent time varying convolution code.

Applicants respectfully disagree and note that the Patent Application describes a "zero code" comprising an equivalent time varying convolutional code at least in lines 13-16 on page 10 of the specification and in lines 1-5 on page 13 of the specification".

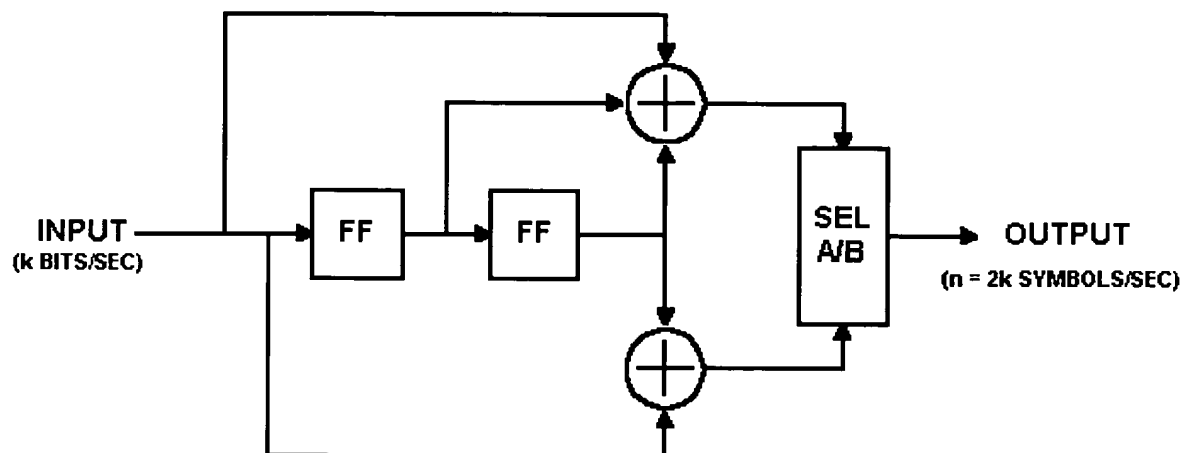
The Examiner disagrees and asserts that lines 13-16 on page 10 and in lines 1-5 on page 13 of the Applicant's specification substantially recite the language in claim 3 and do not teach what a zero code is or what a zero code has to do with a "time varying convolution code". To speed up prosecution, the examiner assumes a zero code is

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either the all zero codeword (e.g. 00000...0000) or a code comprising the all zero codeword. The Examiner requests that the Applicant either confirm this definition or provide a definition and a showing in the specification where that definition is taught. Based on the Examiner's understanding, what does a "time varying convolution code" have to do with the all zero code (e.g. $c=00000...0000$ or $C=\{00000...0000\}$).

The Applicant contends, "In the Office Action, claims 10-22 were rejected under 35 USC 101 because the claimed invention is allegedly directed to non-statutory subject matter. In particular, the Examiner alleges that computer programs are non-statutory. Applicants respectfully disagree and note that a computer program is statutory material if it produces a "usefthl, concrete and tangible result." See MPEP §2106. Applicants respectfully submit that the method set forth in independent claims 10 and 17 produces a useful, concrete and tangible result. In particular, the methods set forth in claims 10 and 17 produce a channel coded data stream. Furthermore, Applicants believe that the methods set forth in claims 10 and 17 fall under the safe harbor provided for processes that require measurements of physical objects or activities to be transformed outside of the computer into computer data. See MPEP §2106. In particular, claims 10 and 17 set forth receiving a digital input data sequence that may be representative of a physical activity performed outside of the computer. For example, the digital input data sequence may be representative of an acoustic signal provided to a microphone. For at least the aforementioned reasons, Applicants respectfully submit that claims 10-22 are directed to statutory subject matter".

The Examiner disagrees and asserts that claim 17 recites receiving a digital input data sequence; periodically inserting known symbols into the digital input data sequence and forming an expanded digital input data sequence based on a constraint length $k=m-1$, wherein m corresponds to a memory length and a code rate is $R=1/l$, such that the known symbols are inserted after each $k-1$ information bit; and trellis encoding the expanded digital input data sequence to produce a channel coded data stream wherein the number of connections between trellis nodes in a trellis are reduced. If Examiner 1 writes a digital input data sequence $s = [0110]$ on a piece of paper and gives the piece of paper to Examiner 2, then Examiner 2 receives a digital input data sequence $s = [0110]$ on a piece of paper. The constraint length of the convolutional encoder in the Figure below is $K= m-1=1$, Examiner 2 can write on the same paper the expanded sequence $es = [00101000]$ by periodically inserting a zero every other bit which is a step carried out by hand for periodically inserting known symbols into the digital input data sequence $s = [0110]$ and forming an expanded digital input data sequence $es = [00101000]$ based on a constraint length $k=m-1=1$, wherein m corresponds to a memory length of the convolutional encoder in the Figure below and a code rate is $R=1/l$ whereby $l=2$, such that the known symbols are inserted after each $k-1=1$ information bits.



Examiner 2 can apply the expanded digital input data sequence $es = [00101000]$ to the Figure, above by visually and hand and to produce an encoded output $ces = [00\ 00\ 11\ 10\ 00\ 10\ 11\ 00]$ which is a step carried out by hand for trellis encoding the expanded digital input data sequence $es = [00101000]$ to produce a channel coded data stream $ces = [00\ 00\ 11\ 10\ 00\ 10\ 11\ 00]$ wherein the number of connections between trellis nodes in a trellis are reduced.

The algorithm presented in claim 17 requires no hardware and can hardly be considered useful when carried out by hand especially when long complex codes and codeword are used (the data would probably be obsolete by the time it was encoded by hand). As such the Examiner maintains that claims 10-22 are non-statutory.

The Applicant contends, "To establish a prima facie case of obviousness, the prior art reference (or references when combined) must teach or suggest all the claim limitations. Simanapalli describes a convolutional encoder 22 that includes a bit insertion controller 28 which may interleave zero bits with input frame bits in an alternating manner. See Simanapalli, col. 3, ll. 3-18 and Figure 2. The Examiner alleges

that inserting zero bits in an alternating manner is equivalent to forming an expanded digital input data sequence based on a constraint length of two. Applicants respectfully disagree. As defined in the specification and in accordance with common usage in the art, the constraint length of a convolutional encoder is determined by a length of a register that receives input from a receiving circuit. See Patent Application, page 11, 11. 13-16 and Figure 1. Accordingly, Applicants respectfully submit that Simanapalii is completely silent with regard to a constraint length of the convolutional encoder 22 and fails to teach or suggest forming an expanded input data sequence based on a constraint length. The Examiner relies upon Kato to describe reducing a number of connections between trellis nodes in a trellis by inserting fixed bits in a bit stream. The fixed bits may be inserted near the central portion of encoding information bit data. In the case of inserting a plurality of bits, the bits may be inserted concentratedly or distributively. See Kato, col. 4, ll. 7-16 and Figures 5A-B. However, Kato is also completely silent with regard to a constraint length.

The Examiner disagrees and asserts that claim 1 only recites, "forming an expanded digital input data sequence based on a constraint length" and the constraint length is an indefinite parameter that can be any constraint length. For Example, a constraint length N could be the maximal allowed block size, the maximum number of information bits or almost any communication parameter that serves to constrain the communication system to a particular mode of operation. Second of all "based on", by itself, is generally indefinite. For example, if the constraint length is related to the number of memory elements in a convolutional encoder, then since convolutional encoded data is

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encoded by the convolutional encoder the convolutional encoded data is based on the constraint length and any element that operates on or uses the convolutional encoded data, operates on or uses, based on the constraint length, the convolutional encoded data since the convolutional encoded data itself is based on the constraint length; hence it is even hard to see how the phrase "based on a constraint length" even adds any meaningful limitation to any claim.

Hence the Bit Insertion Controller 28, Zero Bit Input Source 24 and Register 26 in Figure 2 of Simanapalli is a data receiving circuit for receiving a digital input data sequence 18 comprising Zero Bit Input Source 24 for periodically inserting known symbols into the digital input data sequence and forming an expanded digital input data sequence stored in register 26 based on a constraint length of 2; Note: the Merriam-Webster Collegiate Dictionary defines constrain as to force by imposed stricture, restriction or limitation and constraint as the act of constraining; since bit insertion is limited or restricted to being periodically inserted after every input bit the constraint length for periodic insertion used for forming the expanded digital input data sequence is 2. Furthermore, $k=1$ for bit insertion in Figure 3 of Simanapalli which corresponds to the constraint length $k=1$ of Figure 6 in Kato.

All amendments and arguments by the applicant have been considered. It is the examiner's conclusion that the claims, as amended, are not patentably distinct or non-obvious over the prior art of record in view of the references, Simanapalli; Sivanand (US 6081921 A) in view of Kato; Osamu et al. (US 5436918 A, hereafter referred to as Kato)

as applied in the Non-Final Action filed 05/31/2005. Therefore, the rejection is maintained.

Claim Rejections - 35 USC § 112

The rejections, below, are copied without change from the Non-Final Action filed 05/31/2005.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 17-22 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 3 recites, "the inserted zeros comprise an equivalent time varying convolutional code". Nowhere in the application does the Applicant teach "inserted zeros comprise an equivalent time varying convolutional code".

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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3. Claims 1-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In line 5 of claim 1, "based on" is indefinite since it is not clear how "constraint length" is used for forming an expanded digital input data sequence.

In line 9 of claim 1, "according to" is indefinite since it is not clear how "constraint length" is used for by "said encoder".

Claim 3 recites, "the inserted zeros comprise an equivalent time varying convolutional code", which is nonsense since zeros are zeros not a convolutional code.

In line 5 of claim 10, "based on" is indefinite since it is not clear how "constraint length" is used for forming an expanded digital input data sequence.

In line 6 of claim 10, "based on" is indefinite since it is not clear how "constraint length" is used for forming an expanded digital input data sequence.

Claim 12 recites, "the inserted zeros comprise an equivalent time varying convolutional code", which is nonsense since zeros are zeros not a convolutional code.

In line 5 of claim 17, "based on" is indefinite since it is not clear how "constraint length" is used for forming an expanded digital input data sequence.

Claim 19 recites, "the inserted zeros comprise an equivalent time varying convolutional code", which is nonsense since zeros are zeros not a convolutional code.

Claims 1-22 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission

amounting to a gap between the necessary structural connections. See MPEP § 2172.01.

Claim 1 recites, “forming an expanded digital input data sequence based on a constraint length”. The omitted structural cooperative relationships are: the relationship between “forming an expanded digital input data sequence” and “constraint length”.

Claim 1 recites, “said encoder operative according to the constraint length”. The omitted structural cooperative relationships are: the relationship between “said encoder” and “constraint length”.

Claim 3 recites, “the inserted zeros comprise an equivalent time varying convolutional code”. The omitted structural cooperative relationships are: the relationship between “the inserted zeros” and “an equivalent time varying convolutional code”.

Claim 10 recites, “forming an expanded digital input data sequence based on a constraint length”. The omitted structural cooperative relationships are: the relationship between “forming an expanded digital input data sequence” and “constraint length”.

Claim 10 recites, “trellis encoding the expanded digital input data sequence based on a constraint length”. The omitted structural cooperative relationships are: the relationship between “trellis encoding the expanded digital input data sequence” and “constraint length”.

Claim 12 recites, “the inserted zeros comprise an equivalent time varying convolutional code”. The omitted structural cooperative relationships are: the relationship between “the inserted zeros” and “an equivalent time varying convolutional code”.

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Claim 17 recites, "forming an expanded digital input data sequence based on a constraint length". The omitted structural cooperative relationships are: the relationship between "forming an expanded digital input data sequence" and "constraint length".

Claim 19 recites, "the inserted zeros comprise an equivalent time varying convolutional code". The omitted structural cooperative relationships are: the relationship between "the inserted zeros" and "an equivalent time varying convolutional code".

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
4. Claims 1-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Simanapalli; Sivanand (US 6081921 A) in view of Kato; Osamu et al. (US 5436918 A, hereafter referred to as Kato).

See the Non-Final Action filed 05/31/2005 for detailed action of prior rejections.

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph D. Torres whose telephone number is (571) 272-3829. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert Decady can be reached on (571) 272-3819. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



JOSEPH TORRES
PRIMARY EXAMINER

Joseph D. Torres, PhD
Primary Examiner
Art Unit 2133